



Australian Bureau of Statistics

CensusAtSchool Australia

Education Services home page > CensusAtSchool home page > Year 10 Resources

Resources



CaSMa12 - The Golden Ratio

You can download this activity, the teacher solutions and the [assessment rubric](#) as a rich text file (RTF) at the bottom of the page. Download our printer friendly Prepared Samples as Excel files or access data using the Random Sampler.

Subject Area

Mathematics

Overview

This lesson is suitable as an enrichment activity for students capable of working independently or a class with teacher help. Students investigate whether the ratio between height and bellybutton height conforms to the Golden Ratio. It builds on techniques shown in Video no. 6 in the Professional Support Materials of the C@S pages.

Requirements

- Computer with internet connection
- Spreadsheet software
- Calculator
- Pens and paper
- Student Worksheet

Instructions

Background research

1. In your own words explain the Golden Ratio. Your explanation should include any symbols and rules.
2. Show how the Golden Ratio is calculated mathematically by using an example.
3. Give 3 examples of where the Golden Ratio is found in nature or elsewhere.

Preparation

4. Watch the video titled 'Using CensusAtSchool in the Classroom' from the 'ABS Video Tutorials' page or follow the link below. NB: we are interested in the second presenter. <http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/Professional+Development+Videos+Entry+Page#excel>

In this video Ian Wong, the presenter, asks whether the relationship between bellybutton height and height conforms to the Golden Ratio. Ian uses features of Excel to organise the data and investigate whether it is true or not. He starts by asking: "Can you estimate a person's height from their bellybutton height?" and "The first step is to establish if a relationship exists between height and bellybutton height. If a relationship does exist we can estimate a person's height if we know their bellybutton height?" The video explores whether the ratio between a person's height and bellybutton height is an example of the Golden Ratio.

In this activity students undertake a similar investigation using data from a CensusAtSchool questionnaire.

Note: the version of Excel used is Excel 2003. The functions in the version of Excel you use may be in different locations but you will still be able to perform the same operations. The locations of the features students are shown below in the HELP section.

The investigation

5. Download your own sample of data using the CensusAtSchool random sampler.
6. You will need to make decisions about the sample size, year level and sex of the students in your sample. You may even want to compare two different samples in your investigation.
7. Copy and paste Height and Bellybutton data into a new Excel worksheet. If you want to compare boys with girls you will need to copy sex as well.
8. Using the techniques outlined in Video no. 6 see if you agree that the height/bellybutton height approximates the Golden Ratio.
9. Write a report clearly stating the steps you followed and your conclusion. Include your data and graph.
10. In your report, list the Excel functions you used to complete this investigation. Put an asterisk next to the ones you used for the first time.

Excel 2010 help

Remember the Dependent variable always goes on the y axis. For this activity, let height depend on bellybutton height. This means

bellybutton height needs to be in the first column.

The version of Excel used in the video is Excel 2003. If you are using Excel 2010, the same features can be found by using the following:

- a. To insert a scatterplot: go to Insert > Scatter > choose the first plot
- b. To label your graph: Select graph then > Design>Chart Layouts> choose an option **or** go to Layout>Labels> Chart Title and Axis Titles
- c. To delete a row of data: select data then >Home>Cells> Delete>Delete Sheet Rows
- d. To alter horizontal scale: go to Layout > Axes > Axes> Primary Horizontal Axis > More Primary Horizontal Axis Options>Fixed
- e. To add a trend line and: go to Layout>Analysis>Trend line>More Trend line **its equation** Options>select Linear >select Set Intercept = 0, 0>select Display Equation on chart
- f. To find the mean ratio: calculate height/ belly-button ratio in column C then choose a display cell and type =average (C2: C last cell) **or** Home>Editing> Σ > Average
- g. To COUNTIF: go to Home>Styles>Conditional Formatting>Highlight Cell Rules>Between

Download the Activity

Student Worksheet

RTF

Teacher Solutions

RTF

Assessment Rubric

RTF

[Back to top](#)

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